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**Bibliography**

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**Summary**

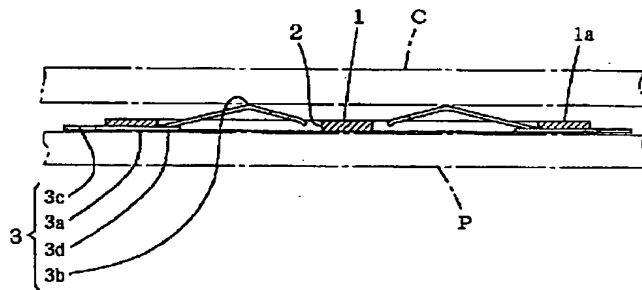
(57) [Abstract]

[Technical problem] The stress concentration to the lead section and housing of a connector is mitigated, the injury on the lead section is prevented, it miniaturizes and housing is thin-shape-ized. Housing is reinforced with a frame, the copra nullity of the lead section is raised, and the efficiency of stress concentration mitigation is raised. An end-connection child and a frame are made into a series, it housing and really casts, and a copra nullity is raised.

[Means for Solution] The tabular housing 1 in which the window part 2 carried out opening, and the end-connection child 3 stationed to the window part Halfway section 3a of a preparation and an end-connection child was fixed to housing partial 1a of a window part rim, elastic deformation of an end-connection child's contact section 3b was made possible in the housing thickness direction near the housing upper surface of a window part, the end-connection child outer edge was set to lead section 3c, and 3d of lead sections for reinforcement prolonged near the housing base of a window part from the halfway section was prepared for the end-connection child. The frame 4 for reinforcement is embedded in housing. Press molding of an end-connection child and the frame is carried out at a series, it housing and really casts, and an end-connection child and a frame are broken off their relationship.

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CLAIMS

[Claim(s)]

[Claim 1] The connector for printed wired boards characterized by providing the following Housing of the tabular in which the window part carried out opening Have the end-connection child stationed corresponding to this window part, and this end-connection child's halfway section is fixed to the housing portion of a window part rim. The lead section for reinforcement prolonged from the halfway section near the housing base of a window part to the above-mentioned end-connection child while it is constituted so that the elastic deformation of the contact section formed in an end-connection child's inner edge can be carried out in the housing thickness direction near the housing upper surface of a window part, and an end-connection child's outer edge is formed in the lead section

[Claim 2] The connector for printed wired boards according to claim 1 by which the frame for reinforcement is embedded in housing.

[Claim 3] The manufacture method of the connector for printed wired boards according to claim 2 which carries out press molding so that an end-connection child and a frame may be connected with a series, and is characterized by, arranging the above-mentioned end-connection child and a frame subsequently to in a mold,

casting housing, and breaking off its relationship an end-connection child and a frame after that.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to improvement of the connector for printed wired boards used in order to make connection of connection of for example, printed wired boards or a printed wired board, a SIM card, etc.

[0002]

[Description of the Prior Art] conventionally, it is shown in drawing 9 as such a connector — as — receipt — the housing 51 of the tabular in which the hole 52 carried out opening, and this receipt — what equipped the hole 52 with the end-connection child 53 stationed, respectively is known (see JP,8-321353,A) this end-connection child 53 — halfway section 53a — receipt — a hole — it fixes to the housing portion of a rim — having — \*\*\*\* — an inner edge — receipt — it curves in the shape of an abbreviation HE character in a hole, and contact section 53b is formed, and an outer edge is prolonged in the method of an outside of housing 51, and forms lead section 53c In the above-mentioned lead section 53c, the surface mount of this connector is carried out to a printed wired board 54. A pressure welding is carried out to the contact sections of 55, such as a printed wired board or a SIM card of the other party, because the above-mentioned contact section 53b carries out elastic deformation in the housing thickness direction (drawing 9 (b) the vertical direction). It is made to achieve mechanical connections and electrical installation by this between printed wired boards (henceforth a substrate pair substrate) or a printed wired board, a SIM card (henceforth a substrate pair card), etc. A SIM card, a PC card, and an IC card are contained in a SIM card here.

[0003]

[Problem(s) to be Solved by the Invention] In such a connector, contact pressures received from 55, such as a printed wired board or a SIM card of the other party, concentrate and act on the fixed part or the contact section to a printed wired board 54 of the lead section 53c and housing 51 through the end-connection child 53. However, if miniaturization of lead section 53c and thin shape-ization are advanced, the fault of a crack going into the fixed part to the printed wired board 54 of lead section 53c, and causing a faulty connection for the stress concentration received by the above-mentioned contact pressure will occur. Moreover, in order to have to secure the intensity of housing 51, the miniaturization and thin shape-ization cannot be advanced but the problem that it does not progress so that the miniaturization of a device which is making connection of a substrate pair substrate or a substrate pair card using this kind of connector may consider also occurs.

[0004] While realizing the miniaturization and thin shape-ization, the place made into the purpose of this invention mitigating the stress concentration in which it is that the inside of housing also supports to a printed wired board by the lead section for reinforcement, and the lead section and housing receive an end-connection child by the contact pressure, and preventing damage on the lead section, miniaturization of housing and thin shape-ization are advanced and it is for offering the connector for printed wired boards which can realize the miniaturization of a device.

[0005] By the way, although "it is said that a copra nullity is obtained", if a copra nullity is obtained with a sufficient precision in the lead sections and no lead section for reinforcement when supporting an end-connection child to a printed wired board in the lead section for reinforcement in addition to the lead section, the function of the lead section for reinforcement of mitigating the stress concentration which the lead section and housing receive is not fully demonstrated. [ that the contact surface to the printed wired board of all the lead sections has gathered in respect of the same, and ]

[0006] Then, by embedding a frame at housing and reinforcing with this invention further, deformation of housing is prevented certainly, a copra nullity is obtained with a sufficient precision in all the lead sections and the lead section for reinforcement, and it aims at offering the connector for printed wired boards which can mitigate certainly the stress concentration which the lead section and housing receive. In addition, in this invention, by connecting an end-connection child and a frame with a series, incorporating this, and casting housing, a copra nullity is obtained with a sufficient precision in all the lead sections and the lead section for reinforcement, and it aims at offering the manufacture method of the connector for printed wired boards which can mitigate certainly the stress concentration which the lead section and housing receive.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the connector for printed wired boards of a claim 1 It has housing of the tabular in

which the window part carried out opening, and the end-connection child by whom it has been arranged corresponding to this window part. This end-connection child's halfway section is fixed to the housing portion of a window part rim, and it is constituted so that the elastic deformation of the contact section formed in an end-connection child's inner edge can be carried out in the housing thickness direction near the housing upper surface of a window part. While an end-connection child's outer edge is formed in the lead section, it is characterized by preparing the above-mentioned end-connection child the lead section for reinforcement prolonged near the housing base of a window part from the halfway section.

[0008] The pressure welding of this connector is carried out to the contact sections, such as a printed wired board of the other party, or a SIM card, because a surface mount is carried out to a printed wired board in the lead section and the contact section carries out elastic deformation in the housing thickness direction, and it achieves mechanical connections and electrical installation with a substrate pair substrate or a substrate pair card by this. In this case, although the contact pressure received from a printed wired board or a SIM card of the other party etc. acts on the lead section and the fixed part to the printed wired board of housing, or the contact section through an end-connection child Since it furthermore acts also on the fixed part or the contact section to the printed wired board of the lead section for reinforcement, while the stress concentration which the lead section and housing receive is mitigated, damage on the lead section is prevented and the miniaturization and thin shape-ization only of the part are attained, the miniaturization of housing and thin shape-ization are attained.

[0009] In the connector for printed wired boards of the claim 1 above-mentioned publication, as for the connector for printed wired boards of a claim 2, the frame for reinforcement is embedded in housing.

[0010] thus, the operation which will be demonstrated by the claim 1 if it carries out -- in addition, deformation of housing is certainly prevented by the reinforcement function of a frame, a copra nullity is obtained with a sufficient precision in all the lead sections and the lead section for reinforcement, and the stress concentration which the lead section and housing receive is mitigated certainly

[0011] It is the manufacture method of the connector for printed wired boards of the above-mentioned claim 2, and a claim 3 carries out press molding so that an end-connection child and a frame may be connected with a series, subsequently to in a mold it arranges the above-mentioned end-connection child and a frame, casts housing, and is characterized by breaking off its relationship an end-connection child and a frame after that.

[0012] According to this manufacture method, although the connector for printed wired boards of the above-mentioned claim 2 is obtained, since an end-connection child and a frame are connected with a series and embedded in housing, a copra nullity is obtained with a much more sufficient precision in all the lead sections and the lead section for reinforcement, and the stress concentration which the lead

section and housing receive is mitigated certainly. Moreover, a set into an end-connection child and the mold of a frame can be managed with 1 action.

[0013]

[Embodiments of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. Drawing 1 - drawing 4 show the connector for printed wired boards concerning an operation gestalt. This connector connects SIM card C of GSM specification which was inserted in printed wired board P built in the cellular phone, and the cellular phone, for example, memorized personal data, and can call it the connector for substrate pair card connection.

[0014] housing of a tabular with which 1 was formed by insulating materials, such as a heat resistant resin, in these drawings -- it is -- this housing 1 -- two-line three trains -- a total of six window parts 2 .. is carrying out opening And the end-connection child 3 to whom it became from the copper alloy and gold plate etc. was performed if needed is stationed at each of this window part 2, respectively. Halfway section 3a is being fixed to housing partial 1a of a window part rim, an inner edge curves in the shape of an abbreviation HE character in a window part 2, and this end-connection child 3 forms contact section 3b, and an outer edge is prolonged in the method of an outside of housing 1, and he forms lead section 3c. Contact section 3b has come to be able to carry out elastic deformation of the contact section 3b in the housing thickness direction (the vertical direction of drawing 1 ) by this composition by the elastic deformation for the cantilever portion from housing partial 1a, and a U character-like bend. Moreover, when the end-connection child's 3 outer edge is formed in lead section 3c and a connector is laid on a printed wired board, it becomes flat-tapped with the base of housing 1 mostly, and printed wired board P is contacted mostly. The configuration of lead section 3c is good also as a configuration of the so-called gal wing type, a bat lead type, J bend type, and others.

[0015] And when 3d is prepared in one for the above-mentioned end-connection child 3 3d of lead sections for reinforcement prolonged near the housing base of a window part 2 from halfway section 3a and a connector is laid on a printed wired board, it becomes flat-tapped with the base of housing 1 mostly, and printed wired board P is contacted mostly. 3d of this lead section for reinforcement may be soldered to printed wired board P, and, then, the fixed intensity to printed wired board P of a connector becomes large. And since a lead sections [ for reinforcement / 3d and 3d ] nose of cam is located in a window part 2, when performing reflow soldering, it is easy to heat and it can certainly fix it. These lead sections 3d and 3d for reinforcement are arranged in the position which becomes almost symmetrical on both sides of the portion prolonged to the end-connection child's 3 contact section 3b by plane view. Thus, although it is desirable since the press force from SIM cardC which contact section 3b receives, and the reaction force from printed wired board P which the two lead sections 3d and 3d for reinforcement receive will balance, if it arranges, it is an arbitrary matter whether it arranges in this way, and the number of 3d of lead sections for reinforcement and arrangement which are formed in one end-

connection child 3 are also an arbitrary matter.

[0016] Furthermore, as shown in drawing 5, the frame 4 for reinforcement is embedded in the housing 1 of the above-mentioned connector. the transverse frames 4a and 4a embedded along the near side where the end-connection child's 3 lead section 3c has not projected this frame 4 among the sides of housing 1, and the window part 2 which counters in the center section of housing 1 — it is embedded to the part inserted by ..., and has longitudinal framing 4b which connects the above-mentioned transverse frames 4 and 4 the rib for reinforcement prepares in these transverse frames 4a and 4a and longitudinal framing 4b if needed — having — moreover, the need — responding — a proper part — stop section 4c .. is formed, and it stops to the resin of housing 1 etc., and is made to unify

[0017] The pressure welding of the above-mentioned connector is carried out to the contact section of SIM card C inserted in a cellular phone because a surface mount is carried out to printed wired board P built in the cellular phone in lead section 3c and contact section 3b carries out elastic deformation in the housing thickness direction, and it achieves mechanical connections and electrical installation with a substrate pair substrate or a substrate pair card by this. The type with which opposite arrangement of the SIM card C is carried out with an abbreviation parallel relation to printed wired board P by inserting SIM card C in the slot formed in housing of a cellular phone here, for example if the desorption structure to the cellular phone of SIM card C is illustrated, Near the contact section of printed wired board P is exposed by having bounded the lid of housing of a cellular phone, and the type with which opposite arrangement of the SIM card C is carried out with an abbreviation parallel relation to printed wired board P because reliance shuts \*\*\*\* is mentioned here in SIM card C. In this case, when it slides SIM card C stuffing this into the inner direction of a window part 2 in contact section 3b of a connector and comes to a plug completion position by the former type, the contact section of SIM card C carries out a pressure welding to contact section 3b of a connector.

Moreover, after the contact section of SIM card C has contacted contact section 3b of a connector by the latter type, the contact section of SIM card C carries out a pressure welding to contact section 3b of a connector according to the closing force of a lid.

[0018] Next, the manufacture method of the above-mentioned connector is explained. Press molding is carried out (a solid line shows to this drawing). first, it is shown in drawing 6 — as — the end-connection child 3 from the same plate W — so that .. and a frame 4 may be connected with a series subsequently, the above-mentioned end-connection child 3 .. and a frame 4 — the inside of a mold — arranging — housing 1 — casting (an imaginary line showing to this drawing) — after that — the end-connection child 3 .. and a frame 4 — a crosspiece — it breaks off its relationship from the remainder of Plate W which became a \*\*, and manufacture is completed now In addition, although drawing 6 shows the example which manufactures two or more connectors simultaneously from the plate W of one sheet,



the number of the connectors manufactured simultaneously is an arbitrary matter.

[0019] Therefore, although the contact pressure  $F_0$  received from SIM card C of the other party acts on the fixed part or the contact section to the lead section 3c and printed wired board P of housing 1 as  $F_l$  and  $F_h$  through the end-connection child 3 with this 1st operation form, respectively as shown in drawing 7. Since it furthermore acts also on the fixed part or the contact section to printed wired board [ of 3d of lead sections for reinforcement ] P as  $F_s$ . While the stress concentration which lead section 3c and housing 1 receive is mitigated, damage on lead section 3c is prevented and the miniaturization and thin shape-ization only of the part are attained, the miniaturization of housing 1 and thin shape-ization are attained.

[0020] moreover, in the housing 1 of a connector, since the frame 4 for reinforcement was embedded, deformation of housing 1 prevents certainly by the reinforcement function of a frame 4 -- having -- all lead section 3c -- a copra nullity obtains with a sufficient precision by ... and 3d of lead sections for reinforcement -- having -- lead section 3c -- the stress concentration which .. and housing 1 receive is mitigated certainly

[0021] furthermore -- since according to the above-mentioned manufacture method the end-connection child 3 and a frame 4 connect with a series in the state where it was connected with Plate W and embedded in housing 1 -- all lead section 3c -- a copra nullity obtains with a much more sufficient precision by ... and 3d of lead sections for reinforcement -- having -- lead section 3c -- the stress concentration which .. and housing 1 receive is mitigated certainly moreover, the end-connection child 3 -- a set into .. and the mold of a frame 4 can be managed with 1 action

[0022] Drawing 8 shows the 2nd operation form and only the configurations near the end-connection child's 3 contact section differ compared with the 1st operation form. That is, with this operation form, after it has employed the so-called bellows type of end-connection child 3 and the end-connection child's 3 inner edge curves in the shape of abbreviation for U characters up in a window part 2, it curves in the shape of an abbreviation HE character further, and contact section 3b is formed.

Contact section 3b has come to be able to carry out elastic deformation of the contact section 3b in the housing thickness direction (the vertical direction of drawing 8 ) by this composition by the elastic deformation for the cantilever portion from housing partial 1a, and a U character-like bend. Since the other composition, the operation, and the effect are completely the same as the 1st operation form, the same sign is attached and description of the 1st operation form is quoted as it is.

[0023] In addition, with the above-mentioned operation form, although the window part and the end-connection child were set to a total of six in two-line three trains, thereby, the number of the window part of this invention and end-connection children and arrangement are not limited. Moreover, the composition near an end-connection child's contact section is not limited to the type illustrated with the above-mentioned operation form, and if it is constituted so that the elastic deformation of the contact section can be carried out in the housing thickness

direction near the housing upper surface of a window part, it can apply this invention. Furthermore, the frame of the arbitrary configuration which has the function for the composition of a frame not to be limited to the above-mentioned operation form, to have thermal resistance, and to reinforce housing should just be embedded in housing. moreover, as fixed structure to housing partial 1 of end-connection child's 3 halfway section 3a a the structure (for example, the structure where the base of housing partial 1a starts a pore or the periphery section formed in halfway section 3a, and stops this —) which the upper surface of halfway section 3a joins to the base of housing partial 1a as illustrated with the 1st operation form Also including the structure which the upper surface of halfway section 3a pastes up on the base of housing partial 1a, it is good, and as illustrated with the 2nd operation form, the structure which embeds halfway section 3a at housing partial 1a is sufficient, and this invention can be applied to any connector of structure. Furthermore, although connection of a substrate pair card was illustrated with the above-mentioned operation form by printed wired board P and SIM card C in a cellular phone, this invention can be widely used to connection of the substrate pair substrate in various devices or a substrate pair card, and not only a SIM card but a PC card, an IC card, etc. are contained in the card in that case. Moreover, as a connection partner, a battery pack etc. is mentioned besides these printed wired boards, a SIM card, etc., and all the media by which, performing a printed wired board, mechanical connections, and electrical installation in the contact section in short is called for are contained.

[0024] [Effect of the Invention] As explained above, the connector for printed wired boards of a claim 1 Since the window part side also supported the end-connection child to the printed wired board by the lead section for reinforcement In connection of a substrate pair substrate or a substrate pair card, the stress concentration which the lead section and housing receive by contact pressures, such as a printed wired board of the other party or a SIM card, is mitigated. It is very effective, when promoting the miniaturization of the pocket device which advances miniaturization of housing, and thin shape-ization, can realize the miniaturization of a device, and is especially illustrated by a cellular phone, the digital storage camcorder/movie, etc., while the miniaturization and thin shape-ization are realizable, preventing the injury on the lead section.

[0025] if it carries out like a claim 2, by embedding and reinforcing a frame at housing in addition to the effect of the above-mentioned claim 1 being acquired, deformation of housing can be prevented certainly, a copra nullity can be obtained with a sufficient precision in all the lead sections and the lead section for reinforcement, and the stress concentration which the lead section and housing receive can be mitigated certainly

[0026] According to the manufacture method of the connector for printed wired boards of a claim 3, since an end-connection child and a frame are connected with a series, it arranges in a mold and housing is cast, a copra nullity is obtained with a

much more sufficient precision in all the lead sections and the lead section for reinforcement, and the stress concentration which the lead section and housing receive can be mitigated certainly. Moreover, a set into an end-connection child and the mold of a frame can be managed with 1 action, and is convenient on housekeeping.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the A-A line cross section of the connector for printed wired boards of the 1st operation gestalt shown in drawing 2 .

[Drawing 2] It is the plan of the 1st operation gestalt.

[Drawing 3] It is the front view of the 1st operation gestalt.

[Drawing 4] It is the left lateral view of the 1st operation gestalt.

[Drawing 5] It is the cross-sectional view of the 1st operation gestalt.

[Drawing 6] It is the reduction plan showing the manufacture method of the 1st operation gestalt.

[Drawing 7] It is an expanded sectional view near the end-connection child of the 1st operation gestalt.

[Drawing 8] It is the drawing 1 equivalent view of the 2nd operation gestalt.

[Drawing 9] The conventional example is shown, (a) is a plan and (b) is the B-B line cross section.

[Description of Notations]

P Printed wired board

C SIM cards (SIM card etc.)

1 Housing

1a The housing portion of a window part rim

2 Window Part

3 End-Connection Child

- 3a Halfway section
- 3b Contact section
- 3c Lead section
- 3d The lead section for reinforcement
- 4 Frame

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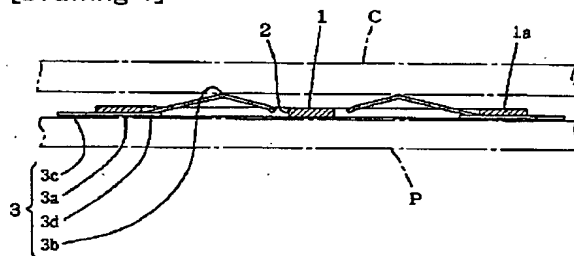
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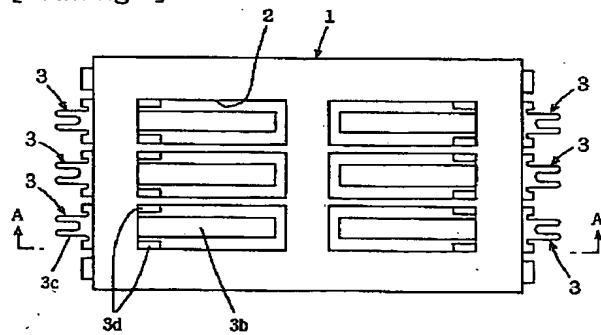
**DRAWINGS**

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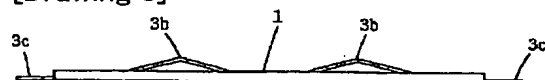
[Drawing 1]



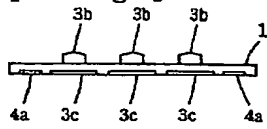
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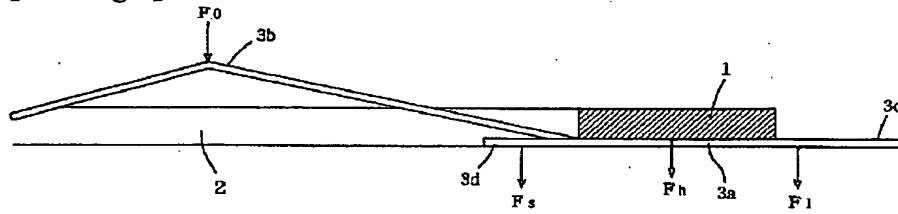
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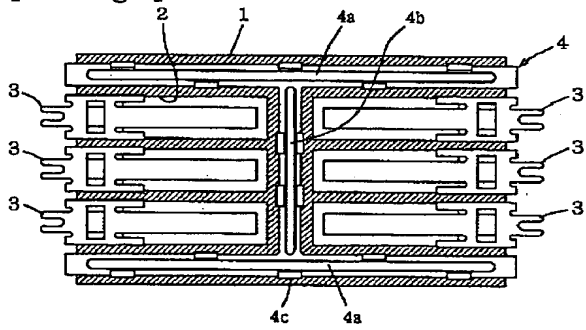
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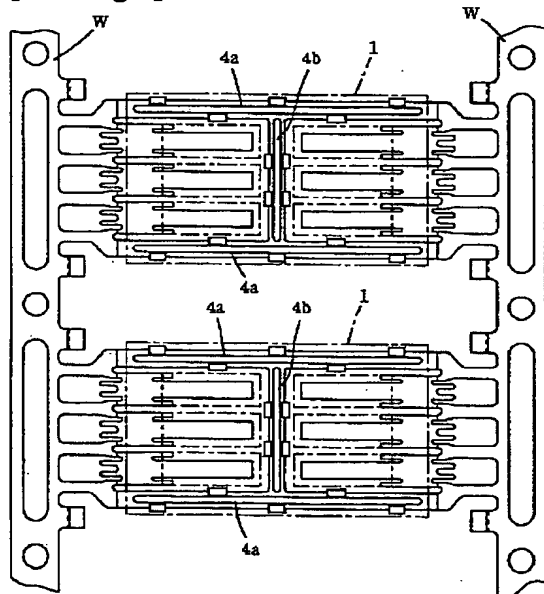
[Drawing 7]



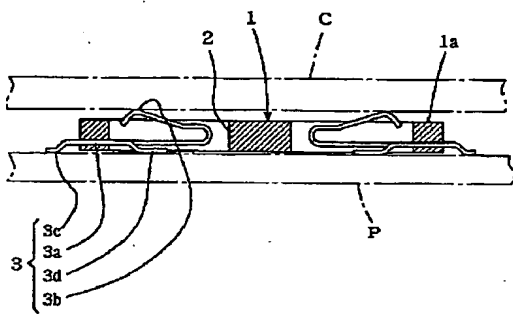
[Drawing 5]



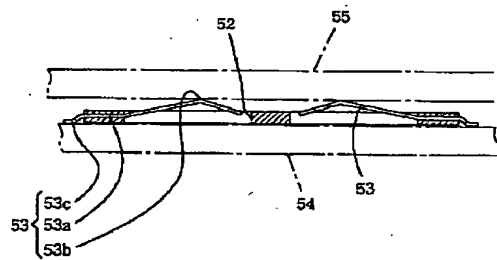
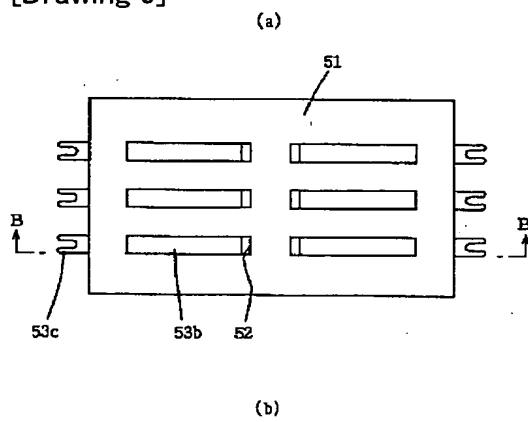
[Drawing 6]



[Drawing 8]



[Drawing 9]



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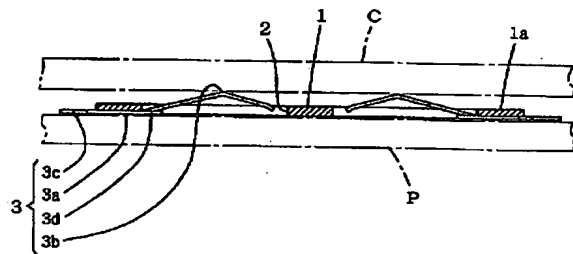
(74) 代理人 弁理士 沼波 知明

(54) 【発明の名称】 プリント配線板用コネクタ及びその製造方法

(57) 【要約】

【課題】 コネクタのリード部及びハウジングへの集中応力を軽減してリード部の損傷を防止し、ハウジングを小型化、薄型化する。ハウジングをフレームで補強してリード部のコプラナリティを高め、集中応力軽減の実効をあげる。接続端子及びフレームを一連にしてハウジングと一体成型し、コプラナリティを高める。

【解決手段】 窓部2が開口した板状ハウジング1と窓部に配置した接続端子3とを備え、接続端子の中途部3aを窓部外縁のハウジング部分1aに固定し、接続端子の接触部3bを窓部のハウジング上面付近でハウジング厚さ方向に弾性変形可能とし、接続端子外端をリード部3cとし、接続端子に、中途部から窓部のハウジング底面付近に延びる補強用リード部3dを設けた。ハウジングに補強用フレーム4を埋め込む。接続端子及びフレームを一連にプレス成型してハウジングと一体成型し、接続端子及びフレームを縁切りする。



## 【特許請求の範囲】

【請求項1】 窓部が開口した板状のハウジングと、この窓部に対応して配置された接続端子とを備え、この接続端子の中途部が窓部外縁のハウジング部分に固定され、接続端子の内端に形成された接触部が窓部のハウジング上面付近でハウジング厚さ方向に弾性変形できるように構成され、接続端子の外端がリード部に形成されていると共に、上記接続端子には、中途部から窓部のハウジング底面付近に延びる補強用リード部が設けられていることを特徴とするプリント配線板用コネクタ。

【請求項2】 ハウジングに、補強用のフレームが埋め込まれている請求項1記載のプリント配線板用コネクタ。

【請求項3】 接続端子及びフレームを一連に連結するようプレス成型し、次いで上記接続端子及びフレームを型内に配置してハウジングを成型し、その後接続端子及びフレームを縁切りすることを特徴とする請求項2記載のプリント配線板用コネクタの製造方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、例えばプリント配線板同士の接続、又はプリント配線板とSIMカード等との接続を実現するために用いられるプリント配線板用コネクタの改良に関する。

## 【0002】

【従来の技術】従来、このようなコネクタとして、例えば図9に示すように、収納孔52が開口した板状のハウジング51と、この収納孔52にそれぞれ配置された接続端子53とを備えたものが知られている（例えば、特開平8-321353号公報を参照）。この接続端子53は、中途部53aが収納孔外縁のハウジング部分に固定されており、内端が収納孔のなかで略へ字状に湾曲して接触部53bを形成しており、外端がハウジング51の外側方に延びてリード部53cを形成している。このコネクタは、上記リード部53cにおいてプリント配線板54に表面実装され、上記接触部53bがハウジング厚さ方向（図9（b）では上下方向）に弾性変形することで相手側のプリント配線板又はSIMカード等55の接触部に圧接し、これによってプリント配線板同士（以下、基板対基板という）又はプリント配線板とSIMカード等との間（以下、基板対カードという）で機械的接続及び電気的接続を果たすようにしている。ここでいうSIMカード等にはSIMカード、PCカード、ICカードが含まれる。

## 【0003】

【発明が解決しようとする課題】このようなコネクタでは、相手側のプリント配線板又はSIMカード等55から受けた圧接力は、接続端子53を介してそのリード部53c及びハウジング51のプリント配線板54への固定部又は接触部に集中して作用する。ところが、リード

部53cの小型化、薄型化を進めると、上記圧接力により受ける集中応力のために、リード部53cのプリント配線板54への固定部に例えばクラックが入って接続不良を来すという不具合が発生する。また、ハウジング51の強度を確保しなければならないために、その小型化、薄型化を進めることができず、この種のコネクタを用いて基板対基板又は基板対カードの接続を行っている機器の小型化が思うように進まないという問題も起きる。

10 【0004】本発明の目的とするところは、接続端子をハウジングの内側でも補強用リード部によりプリント配線板に支持することで、圧接力によりリード部及びハウジングが受ける集中応力を軽減し、リード部の損傷を防止しながらその小型化、薄型化を実現すると共に、ハウジングの小型化、薄型化を進め、機器の小型化を実現できるプリント配線板用コネクタを提供することにある。

【0005】ところで、全てのリード部のプリント配線板への接触面が同一面で揃っていることを「コプラナリティが得られる」というが、リード部に加えて補強用リード部で接続端子をプリント配線板に支持するときには、全てのリード部及び補強用リード部でコプラナリティを精度良く得なければ、リード部及びハウジングが受ける集中応力を軽減するという補強用リード部の機能が十分に発揮されない。

20 【0006】そこで、本発明では、さらに、ハウジングにフレームを埋め込んで補強することにより、ハウジングの変形を確実に防止して、全てのリード部及び補強用リード部でコプラナリティを精度良く得て、リード部及びハウジングが受ける集中応力を確実に軽減できるプリント配線板用コネクタを提供することを目的とする。加えて本発明では、接続端子及びフレームを一連に連結し、これを取り込んでハウジングを成型することにより、全てのリード部及び補強用リード部でコプラナリティを精度良く得て、リード部及びハウジングが受ける集中応力を確実に軽減できるプリント配線板用コネクタの製造方法を提供することを目的とする。

## 【0007】

【課題を解決するための手段】上記目的を達成するため、請求項1のプリント配線板用コネクタは、窓部が開口した板状のハウジングと、この窓部に対応して配置された接続端子とを備え、この接続端子の中途部が窓部外縁のハウジング部分に固定され、接続端子の内端に形成された接触部が窓部のハウジング上面付近でハウジング厚さ方向に弾性変形できるように構成され、接続端子の外端がリード部に形成されていると共に、上記接続端子には、中途部から窓部のハウジング底面付近に延びる補強用リード部が設けられていることを特徴としている。

30 【0008】このコネクタは、リード部においてプリント配線板に表面実装され、接触部がハウジング厚さ方向に弾性変形することで相手側のプリント配線板又はS I



Mカード等の接触部に圧接し、これによって基板対基板又は基板対カードで機械的接続及び電気的接続を果たす。その場合、相手側のプリント配線板又はSIMカード等から受けた圧接力は、接続端子を介してそのリード部及びハウジングのプリント配線板への固定部又は接触部に作用するが、さらに補強用リード部のプリント配線板への固定部又は接触部にも作用するので、その分だけリード部及びハウジングが受ける集中応力が軽減され、リード部の損傷が防止され、その小型化、薄型化が可能となると共に、ハウジングの小型化、薄型化が可能となる。

【0009】請求項2のプリント配線板用コネクタは、上記請求項1記載のプリント配線板用コネクタにおいて、ハウジングに、補強用のフレームが埋め込まれている。

【0010】このようにすれば、請求項1で発揮される作用に加えて、フレームの補強機能によりハウジングの変形が確実に防止され、全てのリード部及び補強用リード部でコプラナリティが精度良く得られ、リード部及びハウジングが受ける集中応力が確実に軽減される。

【0011】請求項3は、上記請求項2のプリント配線板用コネクタの製造方法であり、接続端子及びフレームを一連に連結するようプレス成型し、次いで上記接続端子及びフレームを型内に配置してハウジングを成型し、その後に接続端子及びフレームを縁切りすることの特徴としている。

【0012】この製造方法によれば、上記請求項2のプリント配線板用コネクタが得られるが、接続端子及びフレームが一連に連結されてハウジングに埋め込まれるから、全てのリード部及び補強用リード部でコプラナリティが一層精度良く得られ、リード部及びハウジングが受ける集中応力が確実に軽減される。また、接続端子及びフレームの型内へのセットが1アクションで済む。

【0013】

【発明の実施の形態】以下、本発明の実施の形態を図面に基づいて説明する。図1～図4は実施形態に係るプリント配線板用コネクタを示す。このコネクタは、携帯電話に内蔵されたプリント配線板Pと、携帯電話に差し込まれ、例えば個人データを記憶したGSM規格のSIMカードCとを接続するものであり、基板対カード接続用のコネクタといえる。

【0014】これらの図において、1は例えば耐熱性樹脂等の絶縁材で形成された板状のハウジングであって、このハウジング1には2行3列で合計6つの窓部2・・・が開口している。そして、この各窓部2には、例えば銅合金よりなり必要に応じて金メッキ等が施された接続端子3がそれぞれ配置されている。この接続端子3は、中途部3aが窓部外縁のハウジング部分1aに固定されており、内端が窓部2のなかで略へ字状に湾曲して接触部3bを形成しており、外端がハウジング1の外側方に延

びてリード部3cを形成している。この構成により、接触部3bは、ハウジング部分1aからの片持ち部分、及びU字状湾曲部分の弾性変形により、接触部3bがハウジング厚さ方向（図1の上下方向）に弾性変形できるようになっている。また、接続端子3の外端がリード部3cに形成されており、コネクタをプリント配線板上に載置したときに、ほぼハウジング1の底面と面一となり、プリント配線板Pにほぼ接触するようになっている。リード部3cの形状は、いわゆるガルウィング・タイプ、バットリード・タイプ、Jベンド・タイプ、その他の形状としてもよい。

【0015】そして、上記接続端子3には、中途部3aから窓部2のハウジング底面付近に延びる補強用リード部3d、3dが一体的に設けられており、コネクタをプリント配線板上に載置したときに、ほぼハウジング1の底面と面一となり、プリント配線板Pにほぼ接触するようになっている。この補強用リード部3dはプリント配線板Pにハンダ付けしてもよく、そのときにはコネクタのプリント配線板Pへの固定強度が大きくなる。しかも、補強用リード部3d、3dの先端は窓部2のなかに位置するので、リフローハンダ付けを行うときに、加熱が容易であり、確実に固定できる。この補強用リード部3d、3dは、平面視で接続端子3の接触部3bへ延びる部分を挟んでほぼ対称となる位置に配置されている。このように配置すれば、接触部3bが受けるSIMカードCからの押圧力と、2つの補強用リード部3d、3dが受けるプリント配線板Pからの反力がバランスするので好ましいが、このように配置するか否かは任意事項であり、1つの接続端子3に形成する補強用リード部3dの数及び配置もまた任意事項である。

【0016】さらに、図5に示すように、上記コネクタのハウジング1には、補強用のフレーム4が埋め込まれている。このフレーム4は、ハウジング1の辺のうち、接続端子3のリード部3cが突出していない側の辺に沿って埋め込まれた横フレーム4a、4aと、ハウジング1の中央部において対向する窓部2・・・で挟まれた部位に埋め込まれ、上記横フレーム4、4を連結する縦フレーム4bとを備える。これら横フレーム4a、4a及び縦フレーム4bには、必要に応じて補強用のリブが設けられ、また必要に応じて適宜な箇所に係止部4c・・・が形成され、ハウジング1の樹脂等に係止して一体化するようになっている。

【0017】上記コネクタは、リード部3cにおいて携帯電話に内蔵されたプリント配線板Pに表面実装され、接触部3bがハウジング厚さ方向に弾性変形することで携帯電話に差し込まれるSIMカードCの接触部に圧接し、これによって基板対基板又は基板対カードで機械的接続及び電気的接続を果たす。ここで、SIMカードCの携帯電話への脱着構造を例示すると、例えばSIMカードCを携帯電話のハウジングに形成されたスロットに

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差し込むことでSIMカードCがプリント配線板Pに対して略平行関係をもって対向配置されるタイプ、携帯電話のハウジングの蓋を跳ね上げることでプリント配線板Pの接触部付近を露出させ、ここにSIMカードCを当てがい蓋を閉めることでSIMカードCがプリント配線板Pに対して略平行関係をもって対向配置されるタイプなどが挙げられる。その場合、前者のタイプではSIMカードCがコネクタの接触部3bに当たってこれを窓部2の内方に押し込みつつスライドし、差し込み完了位置にきたときにSIMカードCの接触部がコネクタの接触部3bに圧接する。また、後者のタイプではSIMカードCの接触部がコネクタの接触部3bに接触した状態で蓋の閉じ力によりSIMカードCの接触部がコネクタの接触部3bに圧接する。

【0018】次に、上記コネクタの製造方法を説明する。まず、図6に示すように、同一の板材Wから接続端子3・・及びフレーム4を一連に連結するようプレス成型し（同図に実線で示す）、次いで上記接続端子3・・及びフレーム4を型内に配置してハウジング1を成型し（同図に仮想線で示す）、その後接続端子3・・及びフレーム4を、栈状になった板材Wの残部から縁切りし、これで製造を完了する。なお、図6は1枚の板材Wから同時に複数のコネクタを製造する例を示しているが、同時に製造するコネクタの数は任意事項である。

【0019】従って、この第1実施形態では、図7に示すように、相手側のSIMカードCから受けた圧接力F<sub>o</sub>は、接続端子3を介してそのリード部3c及びハウジング1のプリント配線板Pへの固定部又は接触部にそれぞれF<sub>1</sub>、F<sub>h</sub>として作用するが、さらに補強用リード部3dのプリント配線板Pへの固定部又は接触部にもF<sub>s</sub>として作用するので、その分だけリード部3c及びハウジング1が受ける集中応力が軽減され、リード部3cの損傷が防止され、その小型化、薄型化が可能となると共に、ハウジング1の小型化、薄型化が可能となる。

【0020】また、コネクタのハウジング1には、補強用のフレーム4を埋め込んだので、フレーム4の補強機能によりハウジング1の変形が確実に防止され、全てのリード部3c・・及び補強用リード部3d・・でコプラナリティが精度良く得られ、リード部3c・・及びハウジング1が受ける集中応力が確実に軽減される。

【0021】さらに、上記製造方法によれば、接続端子3及びフレーム4が板材Wにつながった状態で一連に連結してハウジング1に埋め込まれるから、全てのリード部3c・・及び補強用リード部3d・・でコプラナリティが一層精度良く得られ、リード部3c・・及びハウジング1が受ける集中応力が確実に軽減される。また、接続端子3・・及びフレーム4の型内へのセットが1アクションで済む。

【0022】図8は第2実施形態を示し、第1実施形態に較べて接続端子3の接触部付近の形状のみが異なっ

いる。すなわち、この実施形態では、いわゆるベローズ・タイプの接続端子3を採用しており、接続端子3の内端が窓部2のなかで上方に略U字状に湾曲してから更に略へ字状に湾曲して接触部3bを形成している。この構成により、接触部3bはハウジング部分1aからの片持ち部分、及びU字状湾曲部分の弾性変形により、接触部3bがハウジング厚さ方向（図8の上下方向）に弾性変形できるようになっている。それ以外の構成、作用及び効果は第1実施形態と全く同一であるので、同一の符号を付して第1実施形態の解説をそのまま引用する。

【0023】なお、上記実施形態では窓部及び接続端子を2行3列で合計6つとしたが、これにより本発明の窓部及び接続端子の数及び配置が限定されるものではない。また、接続端子の接触部付近の構成は上記実施形態で例示したタイプに限定されるものではなく、接触部が窓部のハウジング上面付近でハウジング厚さ方向に弾性変形できるように構成されておれば本発明を適用できる。さらに、フレームの構成は上記実施形態に限定されるものではなく、耐熱性があるハウジングを補強する機能を有する任意形状のフレームがハウジングに埋め込まれておればよい。また、接続端子3の中途部3aのハウジング部分1aへの固定構造としては、第1実施形態で図示したように、中途部3aの上面がハウジング部分1aの底面に接合する構造（例えばハウジング部分1aの底面が中途部3aに形成した孔部又は周縁部などに掛かってこれを係止する構造、中途部3aの上面がハウジング部分1aの底面に接着する構造などを含む）でもよいし、第2実施形態で図示したように、中途部3aをハウジング部分1aに埋め込む構造でもよく、いずれの構造のコネクタにも本発明を適用できる。さらに、上記実施形態では携帯電話におけるプリント配線板PとSIMカードCとにより基板対カードの接続を例示したが、本発明は各種機器における基板対基板又は基板対カードの接続に対して広く用いることができ、その場合のカードには、SIMカードのみならずPCカード、ICカード等が含まれる。また、接続相手としては、これらプリント配線板やSIMカード等以外にもバッテリーバックなどが挙げられ、要は接触部においてプリント配線板と機械的接続及び電気的接続を行うことが求められるあらゆる媒体が含まれる。

【0024】

【発明の効果】以上説明したように、請求項1のプリント配線板用コネクタは、接続端子を窓部側でも補強用リード部によりプリント配線板に支持したので、基板対基板又は基板対カードの接続において、相手側のプリント配線板又はSIMカード等の圧接力によりリード部及びハウジングが受ける集中応力を軽減し、リード部の損傷を防止しながらその小型化、薄型化を実現できると共に、ハウジングの小型化、薄型化を進め、機器の小型化を実現でき、特に携帯電話、デジタル記録カメラ一体型

VTRなどに例示される携帯機器の小型化を推進する上で極めて効果的である。

【0025】請求項2のようにすれば、上記請求項1の効果が得られることに加えて、ハウジングにフレームを埋め込んで補強することにより、ハウジングの変形を確実に防止して、全てのリード部及び補強用リード部でコプラナリティを精度良く得て、リード部及びハウジングが受ける集中応力を確実に軽減することができる。

【0026】請求項3のプリント配線板用コネクタの製造方法によれば、接続端子及びフレームを一連に連結して型内に配置し、ハウジングを成型するから、全てのリード部及び補強用リード部でコプラナリティが一層精度良く得られ、リード部及びハウジングが受ける集中応力を確実に軽減することができる。また、接続端子及びフレームの型内へのセットが1アクションで済み、段取り上、好都合である。

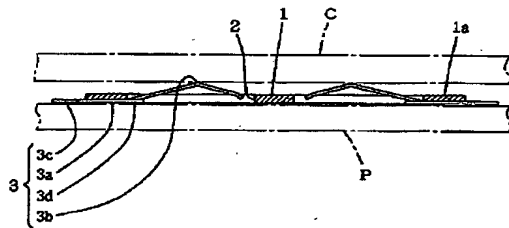
【図面の簡単な説明】

【図1】図2に示した第1実施形態のプリント配線板用コネクタのA-A線断面図である。

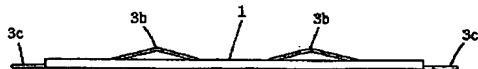
【図2】第1実施形態の平面図である。

【図3】第1実施形態の正面図である。

【図1】



【図3】



\*【図4】第1実施形態の左側面図である。

【図5】第1実施形態の横断面図である。

【図6】第1実施形態の製造方法を示す縮小平面図である。

【図7】第1実施形態の接続端子付近の拡大断面図である。

【図8】第2実施形態の図1相当図である。

【図9】従来例を示し、(a)は平面図、(b)はそのB-B線断面図である。

【符号の説明】

P プリント配線板

C SIMカード (SIMカード等)

1 ハウジング

1a 窓部外縁のハウジング部分

2 窓部

3 接続端子

3a 中途部

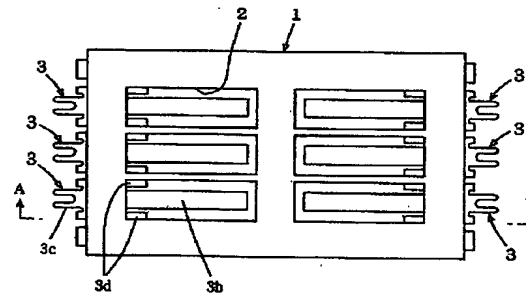
3b 接触部

3c リード部

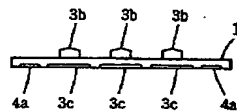
3d 補強用リード部

\* 4 フレーム

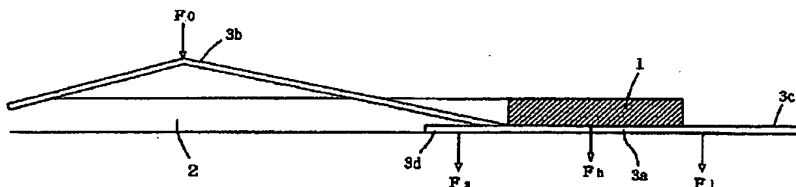
【図2】



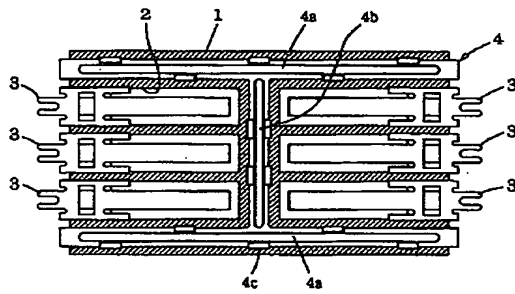
【図4】



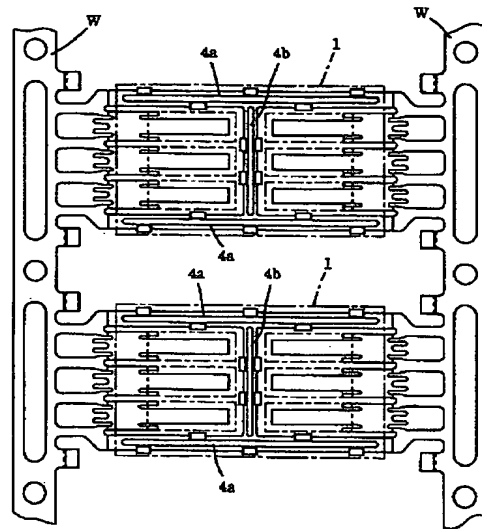
【図7】



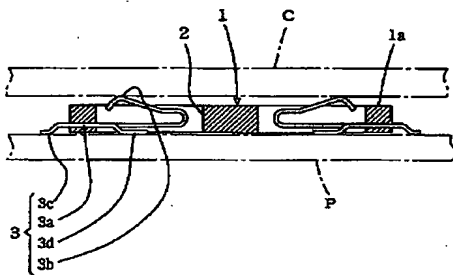
【図5】



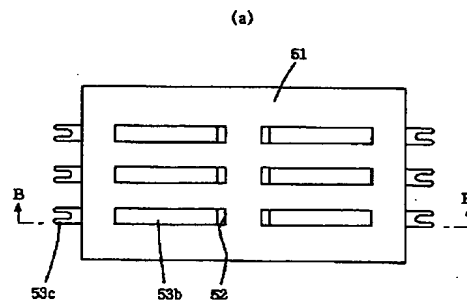
【図6】



【図8】



【図9】



(b)

